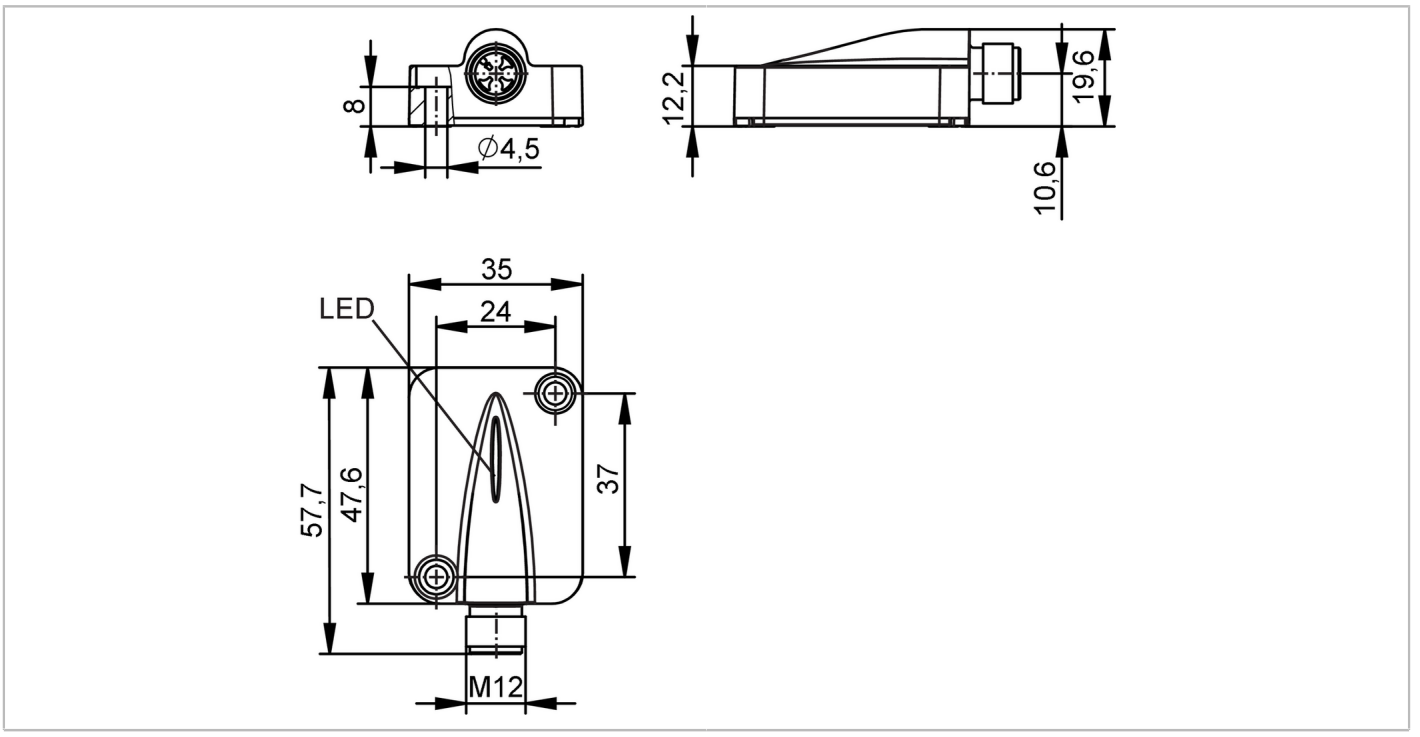
JBC234

Dynamic inclination sensor

INC-K2M180BIAKG/US-V



Product characteristics		
Measuring principle		MEMS capacitive; (3D-accelerometer ; 3D-gyroscope)
Communication interface		IO-Link
Housing		rectangular
Inclination measurement		
Number of measurement axes		2; (Roll + Pitch, depending on the installation position)
Angular range	[°]	± 90; (complete 360° measurement)
Acceleration measurement		
Number of measurement axes		3
Yaw rate measurement		
Number of measurement axes		3
Application		
Design		dynamic inclination sensor for vertical installation position
Function principle		dynamic
Application		use in mobile and industrial applications
Electrical data		
Operating voltage	[V]	9...32 DC; (IO-Link: 18...30 DC); (to SELV/PELV: energy-limited circuits according to IEC/UL 61010-1 3rd ed. cl. 9.4)
Nominal voltage DC	[V]	12...24
Current consumption	[mA]	< 20; (without load 12 V)
Min. insulation resistance	[MΩ]	100; (500 V DC)
Protection class		III

JBC234

Dynamic inclination sensor

INC-K2M180BIAKG/US-V

Reverse polarity protection		yes
Reverse polarity protection		yes
Overvoltage category		II
Power-on delay time	[s]	< 0.1
Inputs / outputs		
Number of inputs and outputs		Number of digital inputs: 1; Number of digital outputs: 2
Inputs		
Number of digital inputs		1; (teach input)
Outputs		
Output signal		IO-Link; switching signal
Electrical design		PNP/NPN; (configurable)
Number of digital outputs		2
Output function		normally open / normally closed; (configurable)
Max. voltage drop switching output DC	[V]	2
Permanent current rating of switching output DC	[mA]	100
Short-circuit protection		yes
Type of short-circuit protection		pulsed
Overload protection		yes
Inclination measurement		
Frequency of the output	[Hz]	250; (4 ms)
Measuring/setting range		
Measuring principle		MEMS capacitive; (3D-accelerometer ; 3D-gyroscope)
Inclination measurement		
Number of measurement axes		2; (Roll + Pitch, depending on the installation position)
Angular range	[°]	± 90; (complete 360° measurement)
Acceleration measurement		
Frequency range	[Hz]	50
Number of measurement axes		3
Measuring range acceleration	[g]	± 8
Resolution	[g]	0.001
Yaw rate measurement		
Number of measurement axes		3
Measuring range vehicle yaw rate	[°/s]	± 1000
Temperature measurement		
Measuring range	[°C]	-40...85
Resolution	[°C]	0.1

JBC234

Dynamic inclination sensor

INC-K2M180BIAKG/US-V

Accuracy / deviations		
Inclination measurement		
Repeatability	[°]	± 0,05
Resolution	[°]	0.01
Temperature coefficient	[1/K]	≤ ± 0,005°
Yaw rate measurement		
Resolution	[°]	0.01
Temperature measurement		
Accuracy	[K]	± 5,0
Dynamic measurement		
Accuracy	[°]	± 0,5
Static measurement		
Accuracy	[°]	± 0,25

Software / programming	
Parameter setting options	Installation position; application profiles; detection of measuring range exceedance / acceleration; ECO-Mode; Teach function; inversion and swapping of the process values
Diagnostic functions	self-test

Interfaces			
Communication interface		IO-Link	
Transmission type		COM3 (230,4 kBaud)	
IO-Link revision		1.1.4	
SDCI standard		IEC 61131-9: 2019-06	
Profiles		Smart Sensor - SSP 4.3.2	Measuring and Switching Sensor, floating point, 2 channel
		BLOB	Binary Large Object transfer
		Common - I&D	Identification and Diagnosis
		Extension	Quantity detection, switches when value exceeds the setpoint
		Function	Locator
		Function	ProductURI
SIO mode		yes	
Required master port type		A	
Min. process cycle time	[ms]	1.4	
IO-Link process data (cyclical)		**function**	**bit length**
		Pitch	32
		Roll	32
		device status	4
		measuring range exceedance / acceleration	1
		SSC1.1	1
		SSC1.2	1
		SSC2.1	1
		SSC2.2	1
IO-Link functions (acyclical)		temperature measurement; detection of measuring range exceedance / acceleration; operating hours counter; Installation position; application profiles; LP filter; raw data; Hysteresis; window; switch points; switching logic; self-test	

JBC234

Dynamic inclination sensor

INC-K2M180BIAKG/US-V

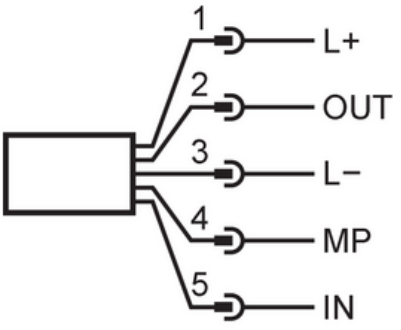
Supported DeviceIDs		**Type of operation**	**DeviceID**
		default	1967
Note		For further information please see the IODD PDF file under "Downloads"	
Operating conditions			
Ambient temperature	[°C]	-40...80	
Storage temperature	[°C]	-40...85	
Max. relative air humidity	[%]	90; (non condensing)	
Max. height above sea level	[m]	5000	
Protection		IP 6K7; IP 6K8; IP 6K9K; (ISO 20653)	
UV radiation		ISO 16750-4, DIN ISO 4892-2	
Chemical media		ISO 16750-5	AA, AB, AC, BA, BB, BC, BE, BF, CC, DA, DB
			chemical resistance of the plastics ; only one chemical permitted at a time
Tests / approvals			
EMC		EN IEC 61000-6-2	immunity / industrial environments
		EN IEC 61000-6-3	noise emission in domestic areas
		EN IEC 61326-2	electrical equipment for measurement, control and laboratory use
		DIN EN 12895	industrial trucks
		DIN ISO 16750-2	pulse 5 (load dump)
Shock resistance		DIN EN 60068-2-27	30 g 6 ms half-sine; 2000 shocks each in every direction of the 6 load axes / Tmin + Tmax
		ISO 16750-3	
		DIN EN 60068-2-27	500-600 g 1 ms half-sine; 3 impacts each in every direction of the 6 load axes
Vibration resistance		DIN EN 60068-2-6	10 g / (10...2000 Hz) 10 frequency cycles in 3 axes
		DIN EN 60068-2-64	5.79 g RMS / (10...2000 Hz) 32 hours in 3 axes
Climatic tests		DIN EN 60068-2-14	
Damp heat		ISO 16750-4	
		IEC 60068-2-38	
MTTF	[years]	282	
UL approval		Ta	-40...65 °C
		Enclosure type	Type 1 / IP 67
		File number UL	E364788
Mechanical data			
Weight	[g]	33	
Housing		rectangular	
Type of mounting		screw mounting; (2 x M4)	
Dimensions	[mm]	57.7 x 35 x 19.6	
Materials		housing: PA glass fibre reinforced; Fixing element: stainless steel (303/1.4305)	
Inclination measurement			
Installation position		vertical	
Plug			
Tightening torque	[Nm]	0.6...1.5	

JBC234

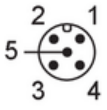
Dynamic inclination sensor

INC-K2M180BIAKG/US-V

Sensor			
Tightening torque	[Nm]	2.4	
Displays / operating elements			
Display		operation	1 x LED, green
		switching status, Teach function	1 x LED, yellow
		fault	1 x LED, red
Operating elements		1 x	Teach-Taste
Accessories			
Items supplied		Torx-cylinder head bolt: 2 x M4 x 14, Screw retention	
		drilling template	
Remarks			
Pack quantity		1 pcs.	
Electrical connection			
Connection			



Connector: 1 x M12; coding: A; Contacts: 5; Maximum cable length: 20 m



1	L+	
2	OUT	DO2 (Pitch)
3	L-	
4	MP	DO1, IO-Link (Roll)
5	IN	DI, teach input

DO: digital output; MP: multi-function connection; DI: digital input

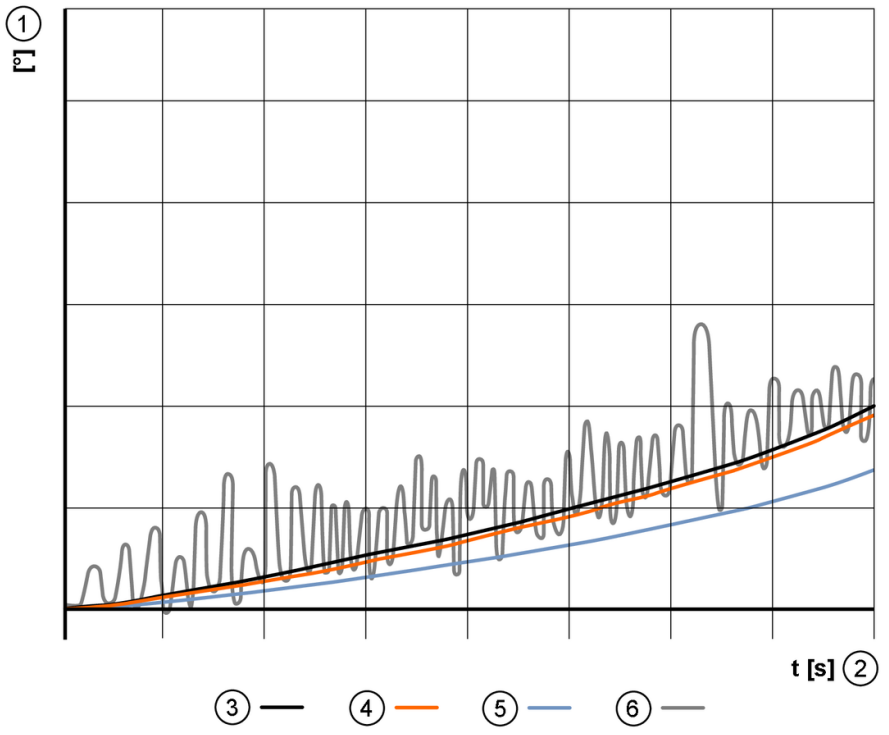
JBC234

Dynamic inclination sensor

INC-K2M180BIAKG/US-V

Diagrams and graphs

vibration compensation curve



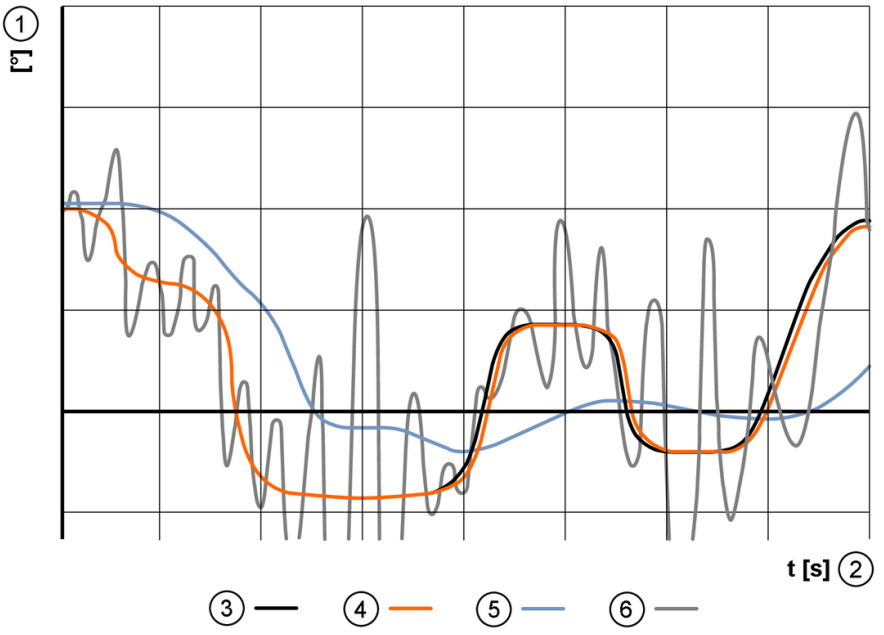
1: angle
2: time
3: reference line
4: JBC
5: filtered
6: unfiltered

JBC234

Dynamic inclination sensor

INC-K2M180BIAKG/US-V

shock compensation curve



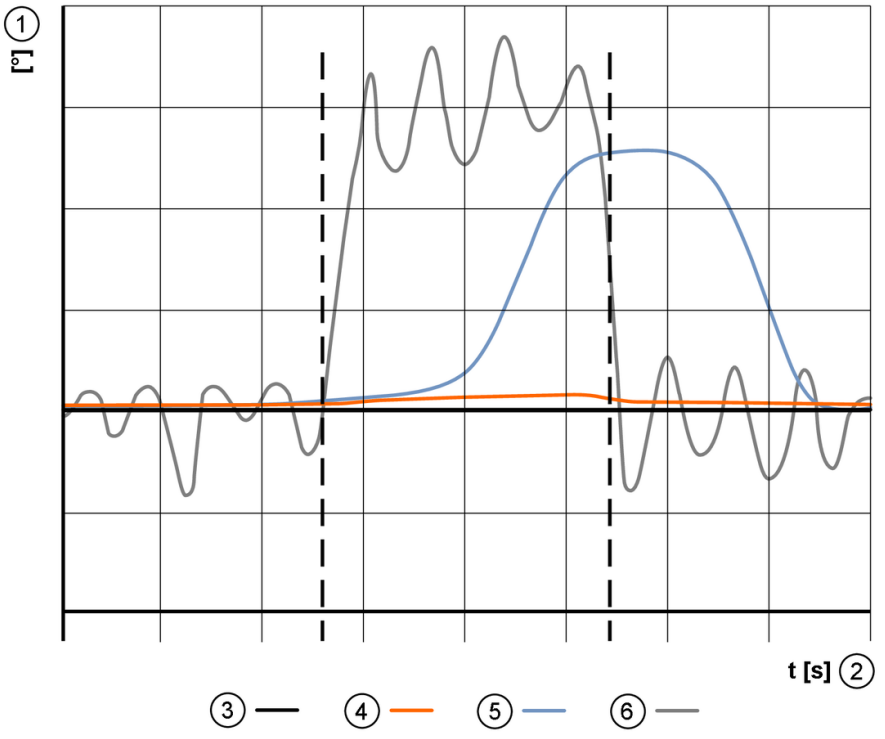
1: angle
2: time
3: reference line
4: JBC
5: filtered
6: unfiltered

JBC234

Dynamic inclination sensor

INC-K2M180BIAKG/US-V

centrifugal force compensation curve



1: angle
2: time
3: reference line
4: JBC
5: filtered
6: unfiltered

vertical installation position